Environmental Noise Assessment

Homewood Lumber Relocation

Town of Loomis, California

Project # 2006-035

Prepared For:

Homewood Lumber

3243 Rippey Road
Loomis, California 95650

Prepared By:

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April 14, 2006

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INTRODUCTION

This study was prepared to address the noise issues related to the relocation of the Homewood Lumber facility located at 3243 Rippey Road in the Town of Loomis, California. The proposed new site is located at the northeast corner of the intersection of Sierra College Road and Brace Road in the Town of Loomis. The proposed project would include the construction of two main structures which would stand approximately 18-20 feet high. The first structure would house approximately 12,800 sf of shop space, 9,400 sf of showroom space, and a 5,060 sf hardware area. The second structure would be a 10,125 sf covered lumber storage area. The project site plan is shown in Figure 1.

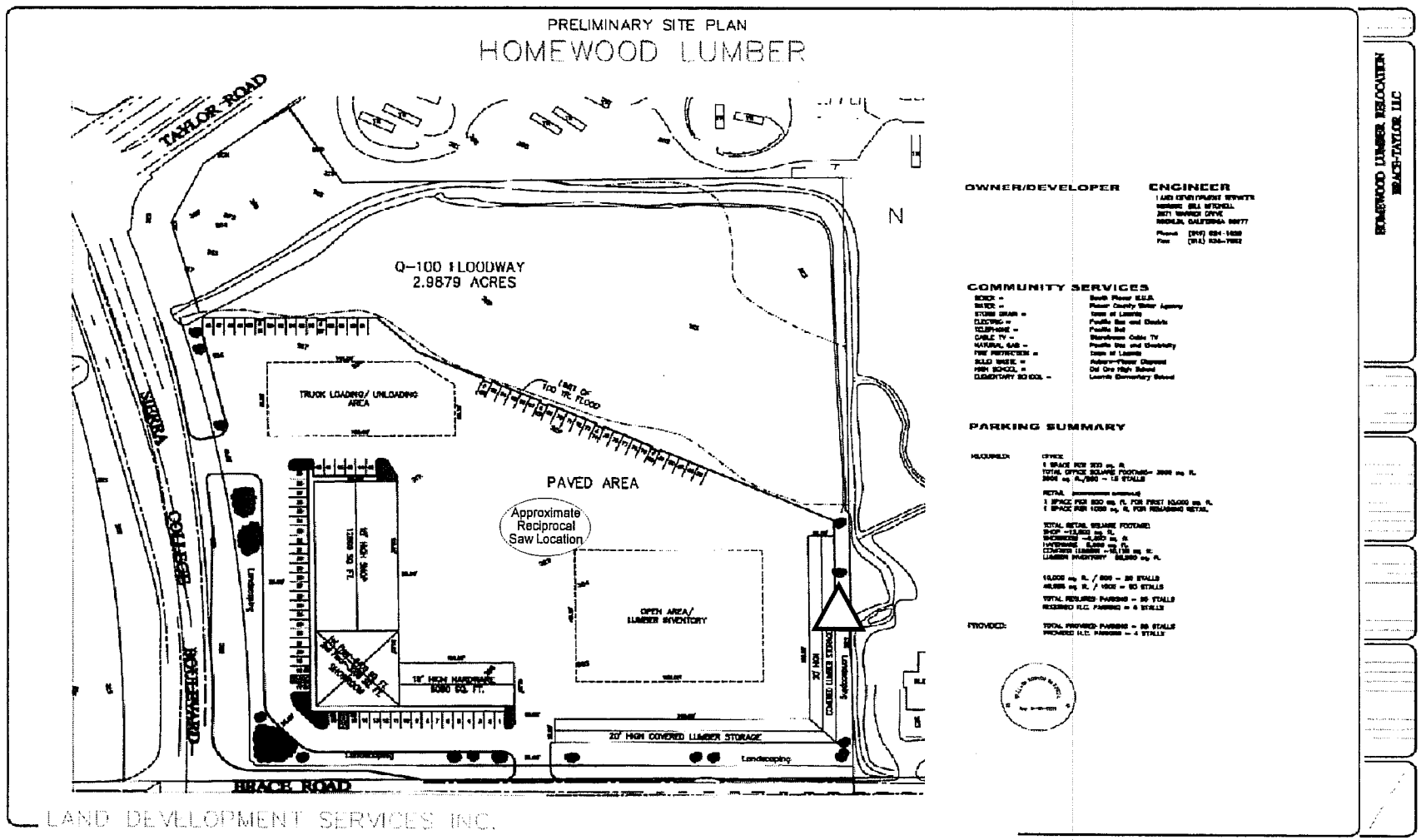
The Town of Loomis has requested an acoustical analysis to determine compliance of the proposed expansion with applicable noise exposure standards at the closest noise-sensitive residential receivers. It is anticipated that noise-producing activities associated with the proposed site will be similar to those currently exhibited at the existing site. Noise producing activities at the current site consist primarily of truck loading/unloading activities, fork lift circulation and the use of a reciprocal saw. The existing and proposed site include a door shop, based upon our observations of the current site and the proposed site plan, the door shop is not anticipated to be a significant noise source.

Please refer to Appendix A for definitions of acoustical terminology used in this report.

CRITERIA FOR ACCEPTABLE NOISE EXPOSURE

Table 8-4 of the Town of Loomis Noise Element establishes exterior noise level standards for "Short Duration Events Near Residential Areas". Those Standards are reproduced below in Table 1. The Table 1 standards are provided in terms of hourly levels, and include adjustments for the time of day the noise occurs, the duration of the intrusive sound, and the characteristics of the noise (impulsive, tonal, speech or music, etc.).

Figure 1
Homewood Lumber Relocation - Town of Loomis, California
Site Plan and Noise Measurement Location



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△ : Noise Measurement Site

Table 1
Town of Loomis Noise Standards for Short Duration Events Near Residential Areas

Receiving Land Use	Duration of Intrusive Sound	Daytime Standard (7 a.m. - 10 p.m.)	Nighttime Standard (10 p.m. - 7 a.m.)
All Residential	30 - 60 minutes per hour (L_{50})	45	40
	15 - 30 minutes per hour	50	45
	5 - 15 minutes per hour	55	50
	1 - 5 minutes per hour	60	55
	Less than 1 minute per hour (L_{max})	65	60

Source: Table 8-4 of the Town of Loomis General Plan Noise Element, July 2001

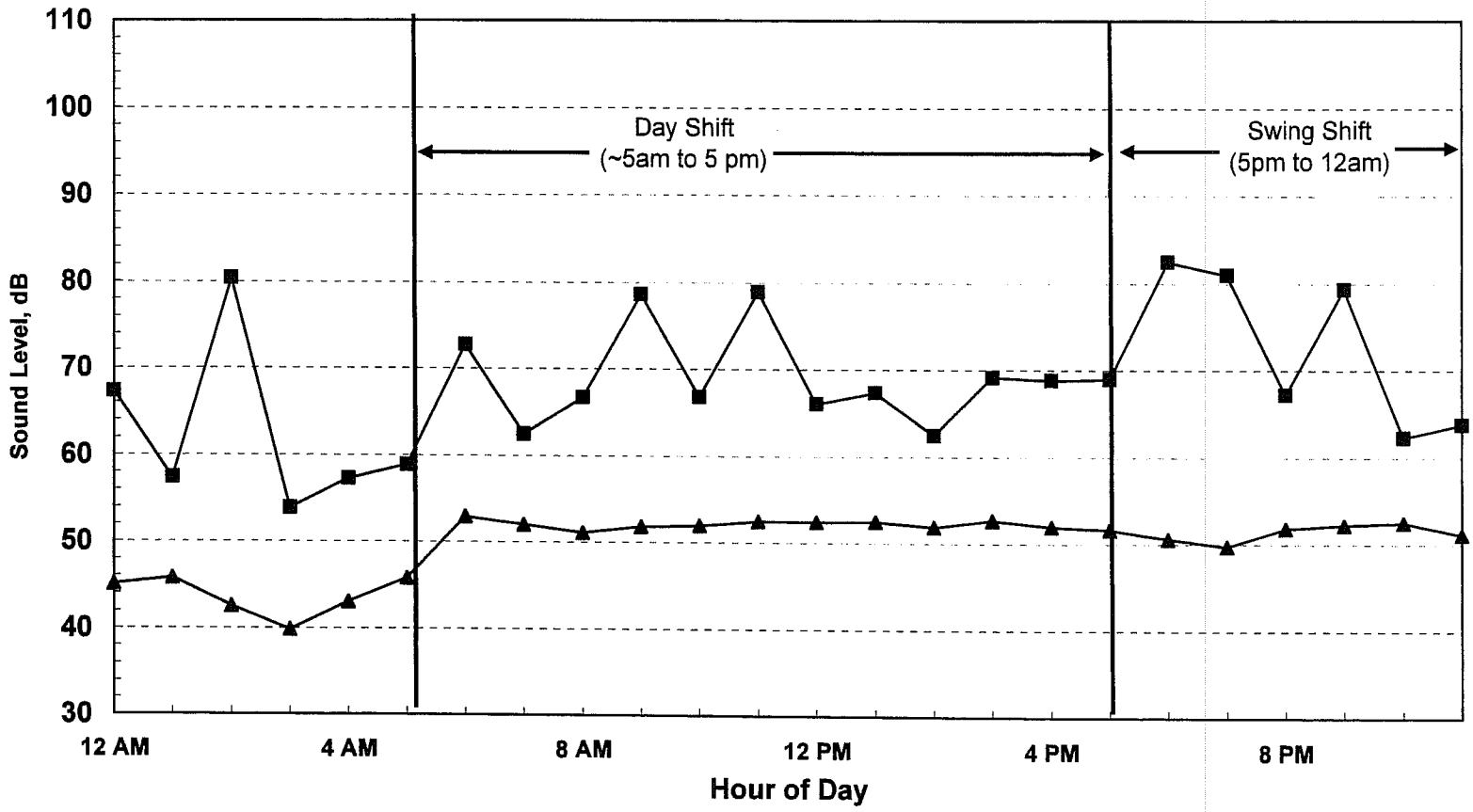
EXISTING AMBIENT NOISE ENVIRONMENT

The existing ambient noise environment is primarily defined by traffic on the local roadways adjacent to the project site, including Brace Road, Taylor Road and Sierra College Blvd. The Union Pacific Railroad tracks located north of Taylor Road and Interstate 80 located approximately 1/4 mile south of the project site also contribute to the ambient noise environment.

j.c. brennan & associates, Inc. conducted continuous (24-hr) sound level measurements on the project site. The noise measurement site was located near the eastern property line of the project site, adjacent to the existing single-family residential uses on Brace Road.

Noise measurement equipment included a Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter. The meter was calibrated in the field before use using a LDL CAL200 acoustical calibrator. The measurement microphone was placed on a microphone boom approximately 5 feet above the ground. Figure 1 shows the noise measurement location. Figure 2 graphically shows the results of the continuous noise measurements at the proposed project site.

Figure 2
24-hr Continous Noise Monitoring Results
Homewood Lumber Relocation - Proposed Site
April 13, 2006



Ldn = 58 dB

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PROJECT-RELATED NOISE EXPOSURE

Reference Noise Level Measurements:

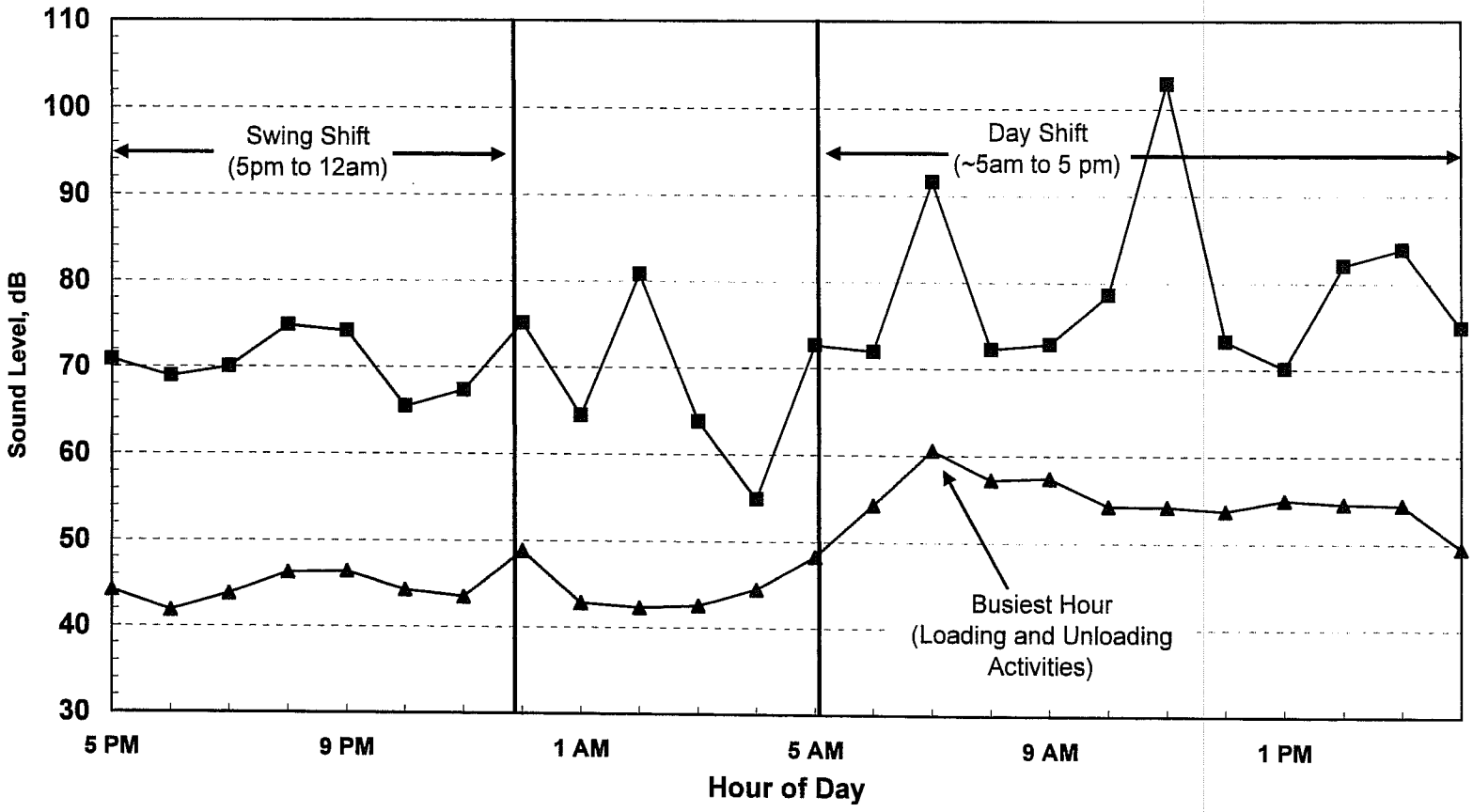
j.c. brennan & associates, Inc. conducted short-term and continuous (24-hour) reference noise level measurement at the existing Homewood Lumber site. The continuous noise measurement site was located at a distance of approximately 150 feet from the center of the central lumber loading area.

Additional short-term noise measurements were used to supplement the continuously collected noise level data. The short-term noise measurements were collected during the busiest hours of lumber loading and unloading activities on March 23, 2006 between 7 am and 9 am. Loading activities consisted of loading 5 Homewood delivery trucks between 7 am and 8 am and unloading two semi-trailers between 8 am and 9am. The short-term noise measurements were conducted at a distance of approximately 75 feet from the center of the lumber loading area.

Noise measurement equipment included a Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter and a LDL model 824 precision integrating sound level meter. The systems were calibrated in the field before and after use using a LDL CAL200 acoustical calibrator. The measurement microphones were located approximately 5 feet above the ground.

The results of the short-term and continuous noise measurements were found to be equivalent when adjusted for distance. The measurement results indicate that a busy hour of loading activities resulted in noise levels of 61 dB L_{50} and 73 dB L_{max} at a distance of 150 feet from the center of the lumber loading area. Primary noise sources included truck movements, idling trucks, and the use of fork lifts. Based upon the observations at the existing Homewood Lumber site, it is our opinion that the measurement results described above represent the busiest hour of activity and the highest noise emission from the existing operation, and accurately represent the typical noise levels that will be produced by the new facility as well. Figure 3 graphically shows the results of the continuous noise measurements at the existing Homewood location.

Figure 3
24-hr Continous Noise Monitoring Results
Homewood Lumber Relocation - Existing Site
March 22-23, 2006



Ldn = 62 dB

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Lumber Loading/Unloading Noise Exposure:

Utilizing the collected reference data, as described above, the predicted project-related noise exposure was calculated at the nearest residential property lines assuming standard spherical spreading loss. The distance from the proposed lumber loading area to the nearest residential uses was measured to be approximately 500 feet to the east (single-family residential) and 500 feet to the south (multi-family residential). The unmitigated noise exposure was found to be approximately 51 dB L_{50} and 63 dB L_{max} for lumber loading and unloading activities. The 51 dB L_{50} noise level would exceed the Town of Loomis 40 dB L_{50} and 50 dB L_{50} noise level standards for daytime and nighttime noise generation. The 63 dB L_{max} noise level would exceed the Town of Loomis 60 dB L_{max} nighttime noise level standard. Therefore mitigation measures will be necessary to achieve compliance with the Town of Loomis noise level standards. Such measures are discussed later in this report.

Fork Lift Movement on the Project Site:

In addition to fork lift activity at the lumber loading area, fork lifts would be used to move inventory in the covered and un-covered lumber storage areas. Homewood Lumber currently uses two different types of diesel powered fork lifts. The majority of the fork lifts are Hyster Model 110 or 120. These fork lifts were measured to generate noise levels of approximately 65 dB Leq and 75 dB L_{max} during typical operation. Homewood Lumber is gradually replacing the older Hyster fork lifts with new Linde Model H50 fork lifts. These fork lifts were observed to be significantly quieter than the older Hyster model fork lifts. The Linde Model H50 fork lifts were measured to generate noise levels of approximately 60 dB Leq and 70 dB L_{max} during typical operation. The center of the primary lumber inventory area is located approximately 200 feet from the nearest residential uses to the east and south. At this distance fork lift circulation would be expected to generate noise levels of 57 dB L_{50} and 67 dB L_{max}. These levels would exceed the Town of Loomis 50 dB L_{50} daytime exterior noise level standard and nighttime exterior noise level standards of 40 dB L_{50} and 60 dB L_{max}. Therefore mitigation measures will be necessary to achieve compliance with the Town of Loomis noise level standards. Such measures are discussed later in this report.

It should be noted that the fork lifts measured for this study did not have backup alarms turned on. It is our understanding that backup alarms would continue to not be used for the fork lifts operating in the lumber yard at the new Homewood location.

Reciprocal Saw Noise Generation:

The existing Homewood Lumber utilizes a reciprocal saw which is located outdoors and is occasionally utilized for extended periods lasting one hour or longer in duration. Close range noise measurements of the saw indicate that the saw generates noise levels of approximately 82 dB L_{50} and 88 dB L_{max} at a distance of 5 feet. Because the saw noise generation is repetitive and tonal, the noise level standards should be lowered by 5 dB as required by the Town of Loomis. Based upon the proposed location of the saw, the nearest residential uses would be located approximately 300 feet from the saw. Based upon this distance and the measured reference noise level data, the saw is expected to generate noise levels of 46 dB L_{50} and 52 dB L_{max} at the nearest residential uses during a busy hour of use. This level would comply with the Town of Loomis 50 dB L_{50} noise level standard which would be lowered to 45 dB L_{50} after applying the 5 dB repetitive/tonal correction. This noise level would exceed the Town of Loomis nighttime noise level standard adjusted to 35 dB L_{50}. Therefore mitigation measures will be necessary to achieve compliance with the Town of Loomis noise level standards for nighttime usage of the saw. Such measures are discussed later in this report. The saw would comply with the Town of Loomis adjusted L_{max} standards of 65 dB L_{max} and 55 dB L_{max} daytime and nighttime noise level standards, respectively.

Mitigation Measures:

The project applicant proposes to utilize site design in order to mitigate exterior noise exposure to the nearest residential uses. The project applicant has proposed to restrict primary truck loading and unloading activities to the location shown on Figure 1. This location provides for the maximum practical setback from the adjacent residential uses. However, additional noise reduction measures would still be required to achieve compliance with the Town of Loomis noise level standards. The project applicant also proposes to construct a covered lumber storage building along the east and south property line of the project site. This structure would act as a sound buffer to the nearest residential uses. In order to estimate the amount of shielding provided by this structure, j.c. brennan & associates, Inc. performed a barrier insertion loss analysis. The analysis indicates that the 20' tall building would provide a significant noise level reduction at the nearest residential uses. Table 2 summarizes the predicted project-related noise levels with and without the proposed covered lumber storage building. Appendix B provides the complete inputs and results of the barrier insertion loss calculations. The Table 2 data also include the predicted fork lift circulation noise levels utilizing the quieter Linde model fork lifts as opposed to the Hyster model fork lifts. The fork lift noise level data as discussed earlier in this study indicate that the Linde model fork lifts are approximately 5 dB quieter than the Hyster model fork lifts.

Table 2
Summary of Project-Related Noise Levels With and Without Noise Reduction Measures
Homewood Lumber Relocation - Town of Loomis, California

		Predicted Noise Exposure		Predicted Noise Exposure with 20' Tall Covered Lumber Storage Building		Town of Loomis Exterior Noise Level Standards (Nighttime)	
Noise Source	Location	Hourly L_{50}	L_{max}	Hourly L_{50}	L_{max}	Hourly L_{50}	L_{max}
Truck Loading/Unloading	Residential to East and South	**51dB**	**63dB**	40 dB	52 dB	40 dB	60 dB
Fork Lift Circulation - Hyster Model Fork Lift		**57dB**	**67dB**	**45 dB**	55 dB	40 dB	60 dB
Fork Lift Circulation - Linde Model Fork Lift		**52 dB**	**62 dB**	40 dB	60 dB	40 dB	60 dB
Reciprocal Saw		**46 dB**	52 dB	29 dB	35 dB	35 dB	55 dB

Bold: Indicates noise levels in excess of the Town of Loomis nighttime exterior noise level standards.
Source: j.c brennan & associates, Inc.

The Table 2 data indicate that usage of the Hyster fork lifts during nighttime hours (10 pm to 7 am) would exceed the Town of Loomis 40 dB L50 nighttime noise level standard after accounting for shielding from the proposed lumber storage building. Therefore, any nighttime fork lift activity should be conducted using the quieter Linde model fork lifts.

CONCLUSIONS & RECOMMENDATIONS

Based upon the reference noise level measurements performed at the existing Homewood Lumber site, the proposed project is predicted to generate noise levels exceeding the Town of Loomis exterior noise level standards without noise reduction measures. Proposed noise reduction measures included in the project design include the designation of a lumber loading/unloading zone as shown on Figure 1 and the use of a 20-foot tall lumber storage building. The following measures should also be considered in order to achieve compliance with the Town of Loomis General Plan Noise Element policies.

- Primary truck loading and unloading activities should be restricted to the proposed loading area and should occur during daytime hours (7 am to 10 pm) to the extent possible;

- Trucks should be discouraged from idling during loading and unloading activities. We recommend that signs be posted around the designated loading area requiring truck engines to be turned off during loading and unloading activities;

- Nighttime (10 pm to 7 am) fork lift usage should be restricted to the use of Linde model forklifts fitted with the best-available stock silencing equipment;

- To the extent feasible, fork lifts should be discourage from traveling along the east or south property lines during nighttime (10 pm to 7 am) hours;

- Backup alarms should not be used for the fork lifts operating on the project site, unless they are located within a closed building.

- The back of the covered lumber storage building should be constructed of a solid material having a minimum density of approximately 3 lbs per square foot. The back of the building must be tightly sealed with no holes or air gaps. We recommend that the building plans for the proposed covered lumber storage building be reviewed by an acoustical consultant prior to construction in order to verify the necessary acoustical performance of the structure.

These conclusions are based upon the site plan provided by the project applicant and the noise level data collected at the existing Homewood Lumber facilities. Variations in the project site plan or proposed operations may cause noise levels to be different from those predicted in this study.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B-1

Barrier Insertion Loss Calculation

Project Information:

Job Number: 2006-035
Project Name: Homewood Lumber Relocation
Location(s): Lumber Loading/Unloading

Noise Level Data:

Source Description: Lumber Loading/Unloading
Source Noise Level, dBA: 51
Source Frequency (Hz): 500
Source Height (ft): 8

Site Geometry:

Receiver Description: Residential Property to East & South
Source to Barrier Distance (C_1): 450
Barrier to Receiver Distance (C_2): 75

Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 15

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	Insertion Loss, dB	Noise Level, dB	Barrier Breaks Line of Site to Source?
15	15	-9.1	41.9	Yes
16	16	-9.5	41.5	Yes
17	17	-10.0	41.0	Yes
18	18	-10.3	40.7	Yes
19	19	-10.7	40.3	Yes
20	20	-11.1	39.9	Yes
21	21	-11.5	39.5	Yes
22	22	-11.9	39.1	Yes
23	23	-12.5	38.5	Yes
24	24	-12.8	38.2	Yes
25	25	-13.2	37.8	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

Appendix B-2

Barrier Insertion Loss Calculation

Project Information:

Job Number: 2006-035
Project Name: Homewood Lumber Relocation
Location(s): Fork lift circulation

Noise Level Data:

Source Description: Fork lift circulation
Source Noise Level, dBA: 57
Source Frequency (Hz): 500
Source Height (ft): 8

Site Geometry:

Receiver Description: Residential Property to East & South
Source to Barrier Distance (C_1): 130
Barrier to Receiver Distance (C_2): 70

Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 15

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	Insertion Loss, dB	Noise Level, dB	Barrier Breaks Line of Site to Source?
15	15	-9.6	47.4	Yes
16	16	-10.1	46.9	Yes
17	17	-10.5	46.5	Yes
18	18	-10.9	46.1	Yes
19	19	-11.5	45.5	Yes
20	20	-11.9	45.1	Yes
21	21	-12.5	44.5	Yes
22	22	-12.9	44.1	Yes
23	23	-13.3	43.7	Yes
24	24	-13.7	43.3	Yes
25	25	-14.0	43.0	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix B-3

Barrier Insertion Loss Calculation

Project Information:

Job Number: 2006-035
Project Name: Homewood Lumber Relocation
Location(s): Reciprocal Saw

Noise Level Data:

Source Description: Reciprocal Saw
Source Noise Level, dBA: 46
Source Frequency (Hz): 5000
Source Height (ft): 5

Site Geometry:

Receiver Description: Residential Property to East & South
Source to Barrier Distance (C_1): 250
Barrier to Receiver Distance (C_2): 100

Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 15

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	Insertion Loss, dB	Noise Level, dB	Barrier Breaks Line of Site to Source?
15	15	-15.9	30.1	Yes
16	16	-16.3	29.7	Yes
17	17	-16.6	29.4	Yes
18	18	-17.1	28.9	Yes
19	19	-17.1	28.9	Yes
20	20	-17.1	28.9	Yes
21	21	-17.1	28.9	Yes
22	22	-17.1	28.9	Yes
23	23	-18.3	27.7	Yes
24	24	-18.3	27.7	Yes
25	25	-18.3	27.7	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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